# AGRICULTURAL NEWS LETTER

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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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# AGRICULTURAL NEWS LETTER

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The AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and new ideas in the field of agriculture, particularly as they are related to advancements through research. Material appearing herein may be reprinted in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

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## HOW'S YOUR MENTAL MURAL?

An Editorial

"Just imagine," said a minister in a Lenten service I attended, "that all your thoughts were dyed blue, and then a bright yellow thought from some outside source was presented and you accepted it. By the time you had completely adopted this new thought, it would have taken on a greenish shade, colored by your old blue preconceptions."

Here is a colorful sort of idea we might all ponder a bit. Whether we're engaged in extension work, or reading an extension bulletin; teaching a class, or attending one; selling fertilizer, or deciding whether to buy some -- we all have problems concerned with imparting, or accepting information of one kind or another.

Of course, if we who have brown thoughts can limit our communications to others who have brown thoughts, it's conceivable our little brown-brained group might achieve perfect understanding. In fact, this type of restricted communication has probably gone on for some centuries in this world of ours. But when a group that has been cultivating just brown thoughts for quite a while tries to visit socially with a family in the next country that has been thinking only chartreuse thoughts for the same period, or do business with people in another country who have been concentrating hard on orange thoughts, some rather serious misunderstandings may occur.

Today, with modern scientific research contributing rapidly to a technology that promises us a near-ideal world in which to live, there is literally no place for people with monochromatic minds. Not only new ideas, but actually new materials with which to clothe ourselves, build our homes, and feed our families are being developed in the laboratory and on the farm. A whole new basis for world cooperation and the better understanding of mankind may now be possible for the first time since the world began, through the discovery of vast new sources of energy which can level out many differences between people and nations.

So, if we are to survive and keep pace with the world, we must be mentally capable of accepting the whole spectrum of new ideas which scientific advances are sending our way. And, having accepted them, we must be able to blend them into a better way of life.

The man with the blue thoughts is going to find himself in a blue funk that leads to mental blindness. If we named thought colors as we name car colors, we might come up with such monikers as "Reactionary Red" and "Backward Brown" -- because the folks who make good in the days ahead will be dipping into a palette of ideas more diverse than a dozen rainbows!

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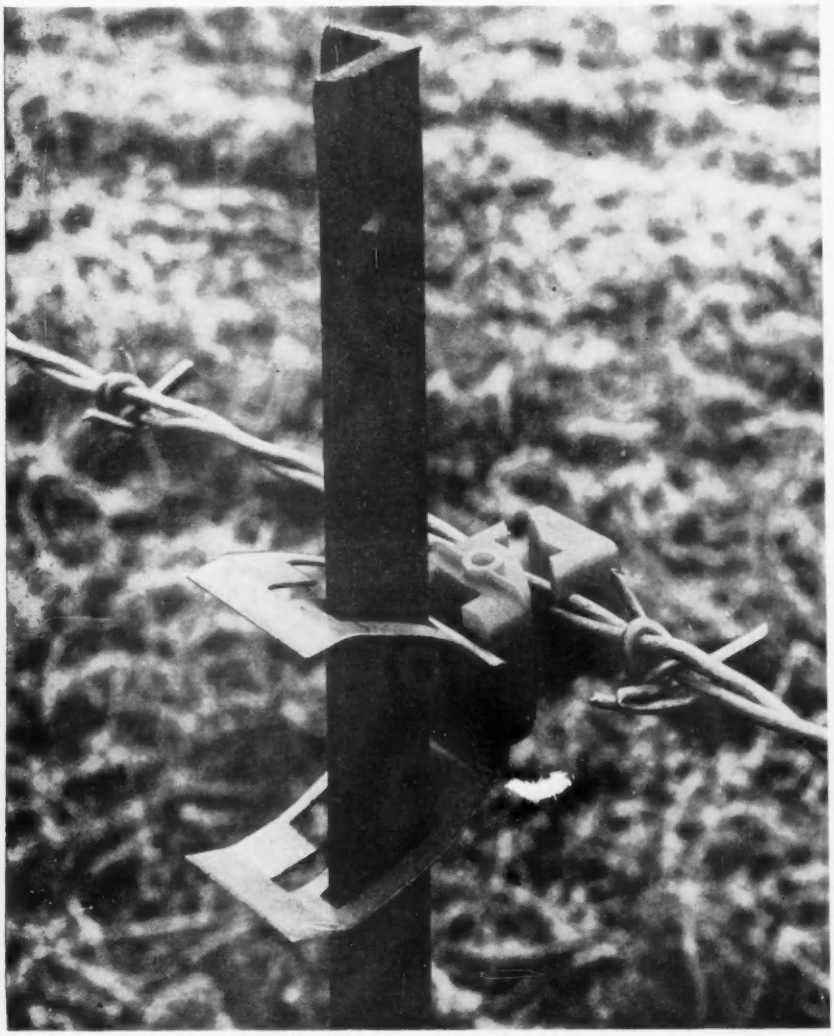
## NO CORROSION, CRACKING, CURRENT LEAKS

## WITH MODERN ELECTRIC FENCE INSULATORS

Latest handy plastic product for the farm is a line of electric fence insulators being made by a Minnesota company from "Alathon" polyethylene resin.

Light and almost indestructible, the insulators are mounted on a variety of spring clips which will secure them to virtually any shape of metal post -- or drilled for spiking to wooden posts. Once the insulator is attached to the post, the wire to be charged is simply snapped into place and held securely as a result of the insulator design. There are no screws to adjust or other movable parts to get out of position and cause grounding of the wire.



Here's the way the new insulators made of "Alathon" polyethylene resin fit an angle-iron post and hold a barbed wire. They may be obtained with clips designed to fit seven types of posts, including wooden ones. Note how wire is tightly retained after being snapped down into the angled slot in the insulator.

Polyethylene, of course, will not corrode, or crack. The same imperviousness to moisture, illustrated by the use of this material around bottle necks to prevent dripping, also prevents current leakage during wet weather in the case of the insulators.

In addition, they're colored a fire-engine red, as a safety precaution.

AMERICANS MAY BUY MORE FOOD,
FEWER AUTOS AND HOMES IN '56

Mr. and Mrs. America -- the individuals whose purchases support both industry and agriculture in this country -- may spend less for such durable goods as automobiles and new homes in 1956, but they will spend more for food and clothing, home operation, and recreation.

Such was the prediction of Ira T. Ellis, economist for the Du Pont Company, in a recent speech. Over the nation, he said, our standard of living will be rising this year as high industrial activity produces greater employment and higher income, accompanied by steady prices.

Mr. Ellis based his forecasts to a large extent on expanding industrial construction now under way and planned for the current year. Manufacturing industries as a whole expect to spend 30 per cent more than last year on their investment in new plants and equipment, and in some industries it will be 65 to 70 per cent higher. Du Pont's expenditures for improved facilities were about $120 million last year and will be higher in 1956 -- perhaps as much as $160-170 million.

While he warned that we have not yet been able to eliminate business cycles, Mr. Ellis was "really optimistic" about the strong market he sees for products of farm and factory in the next 10 years, "if we promote the economic freedom which will let us progress."

"Our population is growing more than 1.5 per cent per year," he explained. "Advancing technology has permitted a rise of about two per cent a year in our standard of living. This means that in order to keep up we need a growth rate of production of at least 3.5 per cent per year for the indefinite future."

But to realize this rosy future, the American farmer and business man must be free to make use of better methods and modern technology, he stressed.

"Employment will be up, personal income will grow, and business activity will be higher, contrary to the fears expressed and attacks on such things as mechanization and the size of business," he said. "If mechanization and investment are curbed, regardless of the method or reasons why, we may face a labor shortage and at the same time a reduction in our standard of living."

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IN WESTERN WASHINGTON AND WESTERN OREGON, "Karmex" DW herbicide is being recommended to control such weeds as groundsel, chickweed, lambs-quarter, dog fennel, annual smartweed, and several annual grasses in established plantings of raspberries, blackberries, and related cane berries. One or two applications of three pounds per acre are required.

# A NEW HORIZON FOR SCIENTIFIC EDUCATION

by Dr. Samuel Lenher, Vice President
E. I. du Pont de Nemours & Company

Reports that Russia may be moving ahead of us in scientific education, at least quantitatively, constitute a challenge which we dare not ignore. I do not refer to this primarily in terms of military defense. The years ahead may bring nothing more than a long, restless period of what the diplomats call peaceful coexistence. But whatever happens, and whatever the Russians do, it is clear that we must place increased emphasis upon scientific education if we are to maintain our position of world leadership against the communist threat to destroy our free society.....

While we usually think of defense in military terms, I would like to discuss the long-range implications of the economic aspect. I take it for granted that all of us want to go forward with the dynamic economy which has given us as a people the highest standard of living ever known to man or king. All of us want to continue the amazing progress we have witnessed in the first half of the Twentieth Century. How can we make sure that these ambitions can be realized?

In my opinion there is but one answer. The future is in the hands of men and women who have scientific knowledge and training. Nearly every citizen of tomorrow will need some measure of scientific education, not only to compete with Russia, but in his own self-interest.

The past is prologue, so it might be helpful to examine what has been happening in our economy. Even the most casual study shows that we have enormously increased the productivity of our mines, farms and factories with new and improved technology developed from scientific research. We are producing more and better things with less effort -- giving us a $400 billion economy in 1955 -- because science has shown us how to substitute energy for human muscles.

This has had a profound effect upon the nature of our work and upon the nature of our work force. The man with the shovel is disappearing from industry and the man with the hoe is fading from the farm. Just as the farmer now cultivates more acres in shorter time with his tractor, the industrial worker moves more materials more quickly with a fork-lift truck, or keeps his eyes on an automatic conveyor system.

We have statistical evidence of these changes. The Bureau of Labor Statistics has found that while one-fourth of our workers were engaged in common labor in 1910, only one-tenth were so engaged in 1950. In contrast, the number of people in industry with scientific training has doubled every 10 years since 1870.

The day of common labor is coming to a close, but there is no cause for regret. To meet the requirements of

improved technology, the common laborer is becoming skilled, and the skilled worker is becoming a technician.....

In talking about industry, I include our mines, our farms, transportation, and the various service establishments. And let us not overlook the distaff side who forsake other careers to run our homes. Every new labor-saving appliance emphasizes the need for some knowledge of science in the household. I would not suggest that every housewife must be an electronic engineer to operate the push buttons and switches which control the cooking, the cleaning, the dishwashing and other chores, but she would find it convenient as well as economical to have enough knowledge to make simple repairs when the appliances break down.

If we can believe the experts, the home of tomorrow will be extremely complex with its solar batteries, heat pumps, weather conditioning, refrigeration, illumination, and cleaning, entertainment and labor-saving devices. Morris D. Hooven, President of the American Institute of Electrical Engineers, suggested recently that all this equipment will be operated from a central control panel, with the day's program determined the night before by punching instructions on a tape fed into the switchboard. I presume there will still be discussions between husbands and wives over whose plan should be punched, and in such debate I suggest that some knowledge of scientific principles might be advantageous.....

Until the turn of the century there was little scientific research in the United States outside of the universities. It is estimated that $4 billion was spent for this purpose in 1955. Virtually every industrial firm of any size is enlarging its laboratories. The Du Pont Company alone spent more than $60 million for research last year, and of this, about 20 per cent was for fundamental research -- that is, the search for further scientific knowledge without any specific commercial objective.

Expenditures for research are expanding not only in industry but in government and the universities. Industry believes that we must still look to the universities for most of the basic scientific information, regardless of the potential for commercial application. Generally speaking, industry in turn has recognized an obligation to help support academic research with financial aid, and is giving increasing attention to this problem.....

Of course I am aware that scientists create problems as well as solve them. Perhaps the outstanding example is the question of survival now that we have atomic fission and fusion, but there are many others. Scientific agriculture made the United States a land of plenty, but it also gave us farm surpluses. Just as the coming of the automobile put the

harness maker out of business, nearly every technological gain in industry creates some problem of change or displacement involving new construction, new employment or new skills of workers. While it is a fact that all of these gains lead eventually to greater employment, the accommodation of the people to these changes is a task for economists, sociologists, and other specialists in human relations, including politics. I do not believe there is any impending shortage among these groups in our society.

Authorities are in general agreement, however, that we need twice our present output of 45,000 engineers and scientists per year. And as we have seen, this inadequacy will grow as our population increases and as the scientific side of our economy becomes more complex.

How are we going to fill this need for scientifically trained intellects? Out of 100 youths who enter school today, only 13 graduate from college, and only three in engineering and science. Testing of intellectual capacity indicates that half of the capable young men, and a third of the exceptionally talented, fail even to go to college.

This is a serious situation. We feel it very keenly in the chemical industry, for our present and future strength is involved. We recognize our strong dependence upon the schools for young men and women with the background of technical knowledge which is so essential for the continued progress of our industry. We have tried to do something about it.

Before selecting a site for a new plant, we make it our business to see that there are good schools in the community. If the coming of the plant will increase the school load, we let it be known that we want to pay our share of the taxes for more facilities. The people in our plants serve on boards of education, and give their support to proposals for school improvement.

We are aware that there is a shortage of science teachers in our secondary schools and colleges. While teaching has other compensations, we know that low salaries are at least partly responsible. I am convinced that you can rely upon the support of industry in every movement to bring teaching salaries to a proper level. In the meantime, our company, for example, has allocated $445,000 of its $900,000 aid-to-education program this year to fellowships, teaching assistantships, and related grants designed to encourage more and better teaching of mathematics and science in high schools as well as colleges.....

The importance of the role of the teacher in shaping the world of the future deserves better recognition!

**EDITOR'S NOTE:** The above article is excerpted from a recent speech by Dr. Lenher at the annual convention of the National Science Teachers Association. Complete text of the talk will be sent on request.

## POLYETHYLENE BAGS FOR CREAM

## SAVE WORK -- IMPROVE BUTTER

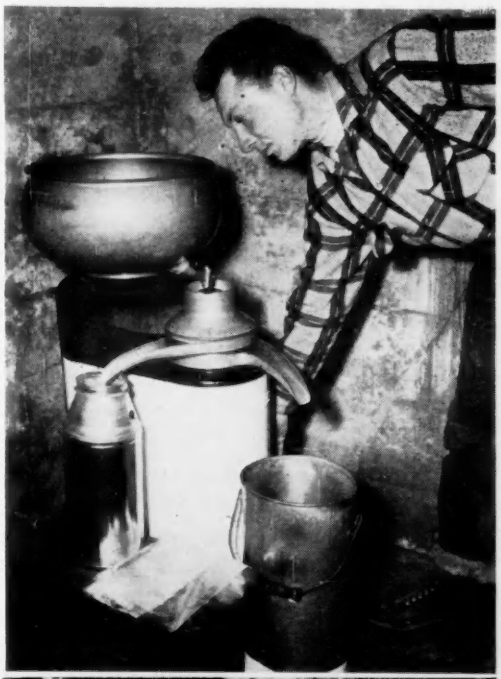
That agriculturally important contribution of the chemical industry -- polyethylene -- is helping solve yet another problem, the improvement of butter quality.

The use of polyethylene in this instance is a step removed from the butter. Bags of the plastic material are being used for collection and storage of cream on the farm, and for its shipment to the creamery. Here's the way it works for cream shippers in northern Missouri who send their cream to the Galva Creamery Company of Galva, Ill., which has pioneered in the use of these polyethylene containers:

The creamery supplies all equipment to its producers -- stainless steel holders for filling the bags, the bags themselves, plastic-covered wire to tie the filled bags, and cardboard cartons for shipping.

The bags each hold five quarts of cream. They are placed in the stainless steel holders so cream from the separator spout can flow directly into the bag with no intermediate handling. By watching a hole in the side of the container, the operator can see when the five-quart level has been reached.

After the top of the bag has been gathered and tied tightly with the plastic-coated wire, it can be handled easily



**New polyethylene bags make cream handling an easy chore, as shown in the pictures at right. In the top photo, cream is separated directly into the bag. Next, top is tied with plastic-coated wire for storage in home refrigerator. When four bags accumulate they are packed in carton for delivery to creamery. The demonstration is by Mr. and Mrs. Howard Hartung of Macon, Mo. (Photos courtesy "Missouri Ruralist")**

and stored in the home refrigerator. No pans, crocks, or other bulky utensils are required. This means cream is put under refrigeration as soon as it is separated -- an important step in maintaining quality.

Shipping cartons hold four bags -- a total weight of less than 40 pounds when filled. Both bags and cartons serve as insulation. Last summer, cream arrived at the creamery at a much lower temperature than it would have in cans or other previously used types of containers. Neither does bagged cream freeze so quickly in cold weather.

Where creameries have their own pick-up routes, smaller trucks can be used since the cartons stack better and require less space. In fact, two cartons with approximately 80 pounds of cream take up the same space as a five-gallon can with 40 pounds.

And at the processing plant, the new bags speed up and simplify operations. There are no heavy cans to handle, or to sterilize and return after they are emptied.

On farms where cream is separated, the new method seems to offer a real advantage for both the producer and the creamery.

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BETTER, LESS EXPENSIVE CONTROL
OF BERRY ROT IS SHOWN IN TESTS

Fungicide trials in the state of Washington last year, aimed at the control of fruit rot in strawberries and raspberries, have given berry growers in the Pacific Northwest high hopes of reducing losses and obtaining better and cheaper control of this disease.

Top performer in the strawberry tests, carried out at Puyallup, was "Zerlate" ziram fungicide. This material costs less to use than others which performed about as well on strawberries at Vancouver and Mt. Vernon, Wash.

In the Puyallup raspberry trials, final total yields were 10,014 pounds of berries per acre where "Zerlate" was used, compared with 8,292 pounds per acre where no fungicide was used. With raspberries bringing 11 cents per pound from freezers, fungicide costing about $12 per acre produced an increased yield worth $189.

Application rates and timing were the same for both fruits. "Zerlate" was applied in a 10 per cent dust at 40 pounds per acre, beginning when plants were about 20 per cent in bloom. Three or four applications were made at two-week intervals.

Use of this fungicide on strawberries is registered with the USDA and a residue tolerance of seven parts per million has been established by the Food and Drug Administration. Application has now been made for use of "Zerlate" on raspberries, which already carry a tolerance of seven parts per million.

# SUBSTITUTED UREA HERBICIDES

By Dr. A. E. Carlson
Grasselli Chemicals Department
E. I. du Pont de Nemours and Company, Inc.

There was a time, not too many years ago, when weed control certainly was not regarded as a science. I can remember the real birth of this science in the late '30's, when only a very few people were identified with research in the control of weeds. We owe a lot to those few courageous men who blazed the trail for such research, as it is conducted today.

As new chemicals are introduced, they give the farmer more practical and economically sound means to control unwanted vegetation so his crops and grazing land will be more productive. Such control has now become an accepted practice with the farmer to such an extent that many states have seen fit to expand the extension staff to include weed control specialists.

Concurrently with this expansion of know-how by governmental agencies, we have had a comparable increase in industrial research in this field. As a result of these many efforts, we are making progress toward understanding the behavior of chemicals in regulating the growth of plants.

Like a number of other chemical manufacturers, the Du Pont Company has had a share in bringing new herbicides into practical usage. Our principal contributions have been ammonium sulfamate and the substituted urea herbicides. Since they represent our newest development, I would like to discuss the latter.

The substituted urea compounds are an extremely interesting group of herbicides. Du Pont has prepared and studied over a thousand of them. At the present time, two of these compounds, monuron (3-(p-chlorophenyl-1,1-dimethylurea) and diuron (3-3,4-dichlorophenyl)-1,1-dimethylurea), are being offered by Du Pont for commercial use. A third, neburon (1-n-butyl-3-(3,4-dichlorophenyl)-1-methylurea), is being introduced in three eastern cities this year as a control for crabgrass and chickweed in lawns and turf. These three compounds plus fenuron (phenyldimethylurea) are all available from Du Pont to research workers who wish to do further study. All four are formulated as wettable powders. We also use other formulations such as pellets and liquid suspensions of monuron and diuron. It is the liquid suspension of diuron which is being used commercially for weed control in cotton in the South.

When comparing the relative efficiency of various weed killers, it is customary to consider a number of basic factors. One characteristic that gives the substituted ureas their versatility is a wide range of water solubility. Some of these compounds are soluble only at the exceedingly low rate

of one part per million while others are much more soluble. Investigators from the high rainfall areas of Washington and Oregon have found that diuron is more satisfactory than monuron because it is only about one-sixth as soluble. In California's Sacramento Valley, on the other hand, monuron, with a solubility of 230 parts per million, provides good results under local rainfall conditions. If you're looking for an even lower solubility than we find with diuron, you might want to try neburon, which dissolves in water at the rate of four parts per million. It has been effective for control of crabgrass in established turf, at four pounds (active) per acre. Evaluation of this compound in agricultural applications might point the way to chemical weed control in crops where no other chemical herbicide has made the grade.

So far as inherent effect on plants is concerned, we know that monuron and diuron are about equal, while neburon and fenuron are considerably less toxic to vegetation.

As we gain more and more experience with the use of the substituted urea herbicides, it becomes apparent that the interacting factors of water solubility, soil adsorption, and inherent toxicity to plants play an important part in determining the uses for which each of these products is most efficient. Monuron and diuron have shown greater versatility for both industrial and agricultural weed control than fenuron. They both have greater inherent plant toxicity and are less soluble in water than fenuron, which dissolves at the rate of 2300 parts per million.

Each of these two preferred compounds show advantages over the other -- depending on the conditions. For non-selective weed control, diuron, which is adsorbed by the soil somewhat more strongly than the monuron compound, and which has a lower water solubility, is generally preferred for use on light soils where rainfall is 20 inches per year or more, and on medium soils if rainfall is 30 inches per year or more.

Similarly, because of its greater water solubility and lower coefficient of adsorption, monuron is recommended in

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New Weed Killer Generic Names

For the first time in "Agricultural New Letter," this article by Dr. Carlson makes use of new generic terms -- monuron, diuron, neburon, and fenuron -- to refer to the various members of the family of substituted urea weed killers developed by Du Pont. These are better known in agricultural circles as the "Karmex" herbicides, withe various letters following the trademark to designate the different compounds. Use of the generic terms to refer to each of these specific compounds, it is hoped, will help better define the uses and methods of application recommended for each.

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preference to diuron for use on heavy soils and on medium heavy soils where rainfall is less than 20 inches per year.

Where an area has been completely freed of vegetation, it can be maintained in this condition at a relatively low cost by the use of 10 pounds per acre per year of one of the substituted urea herbicides, provided the soil is not disturbed. This applies principally to industrial areas. For such annual maintenance, diuron is the preferred product.

The substituted ureas, like all other agricultural chemicals, are subject to registration with the U. S. Department of Agriculture; and for some food crops residue tolerances have been established by the Food and Drug Administration. For some others, it has been found by repeated analysis that none of the chemical appears in the final product. A tolerance of one part per million has been established for monuron and diuron in sugar cane, pineapple, and cotton seed. The same tolerance has been established for monuron in asparagus, spinach, and dry bulb onions.

Du Pont toxicological studies with these compounds indicate that a tolerance of one part per million represents a very large safety factor.

Monuron has been registered with the U. S. Department of Agriculture for weed control on land where the following crops are being grown:

| | |
|---|---|
| sugar cane | spinach (in heavy soils) |
| pineapple | dry bulb onions (in Minnesota and Wisconsin) |
| asparagus | cotton (in Arizona) |
| ornamental bulbs | citrus (in California) |

Diuron, which is a much newer compound, is registered for weed control applications on land where the following crops are being grown:

| | |
|---|---|
| sugar cane | cane berries (in western Washington |
| pineapple | and western Oregon) |
| cotton | grass seed crops (in Oregon) |

In addition, both compounds are registered for use (1) in irrigation and drainage ditches, (2) for spot treatment of perennial weeds in cropland, and (3) for industrial weed control.

The only registered uses for neburon are for control of crabgrass and chickweed in established turf.

In addition to the registered uses, experiments to date indicate that the substituted urea herbicides show parti-

cular promise for control of weeds in alfalfa, peppermint, grapes, and potatoes.

The soil application of monuron for brush control on utility right-of-ways, railroads, and drainage ditches in a six-state area of the Midwest shows considerable promise. For effective control, the spray is applied to the ground encircling the base of the plant at a reasonable distance to include the major root system of the plant. It is not necessary to wet the stem of the plant. The sprayed ring should be about four inches wide. Treatment is effective at any time of the year when rainfall is likely to occur. Two to four ounces of the product have been used in each gallon of spray and one gallon should treat 18 to 20 plants.

Present recommendations for this method of using "Telvar" W weed killer apply only to Oklahoma, Texas, Kansas, Missouri, Arkansas, and Louisiana. Test work is continuing to see if the same recommendation can be adapted to climatic conditions, plant species, and soil types in other areas. Woody plant species which have been controlled by this method include: elm, red cedar, persimmon, hackberry, willow, sumac, buckbrush, and various species of oak.

Applications made during the growing season usually affect the plant within about a month, provided rainfall has occurred to leach material into soil. The above-ground part of severely affected plants in test plots died and became brittle within four to five months after the first appearance of symptoms. Applications made during the dormant season may not show any effects until after plants leaf out.

The substituted ureas look promising for control of certain species of brush on range land. Investigators in Texas have obtained good control of mesquite with applications of pelleted formulations in strips across the area or around the base of individual trees. It is also possible that this method of application can be adapted to industrial right-of-ways.

There is an interesting difference between the use of substituted urea herbicides in the old Cotton Belt and in western irrigated areas. In the old Cotton Belt, the main weed problem occurs early in the season -- from the time seed is planted until the cotton plant is big enough to shade out weed seedlings and withstand mechanical cultivation. This situation used to require a large field force to keep weeds down with hand hoes. Now, one pre-emergence application will control weeds in southern cotton fields for eight weeks or longer.

But in the West, where cotton fields are irrigated, there doesn't seem to be much of a weed problem until the cotton has grown too large for mechanical cultivation, and then annual wild morning glory often becomes serious. Here, the chemical is not applied until mid-season. Weeds are controlled

by cultivation as long as possible and then the chemical is applied just before the last cultivation. Shallow cultivation is used so the chemical is mixed with the top inch (or less) of soil, where it will reach roots of young morning glory and many other annual weeds, without injury to the cotton.

Where the substituted ureas have been used for pre-emergence weed control in cotton, we have found they do not remain in the soil to interfere with subsequent crops.

On irrigated cotton, however, where the chemical is applied in mid-season, we do not recommend planting any crop until spring of the year following herbicidal treatment.

When a grower tries any of the substituted ureas for the first time in one of his crops, we recommend that he make the first trial only on small areas. This is especially important where the operator is not completely familiar with the products themselves, or the methods of calibrating application equipment.

Some day, we may be able to write a prescription for chemical weed killers, just as we now balance a feed ration according to nutrient requirements, or plan a soil-building program on the basis of a soil test. Tailor-made weed killers, designed to fit specific conditions, now seem possible as research workers extend their knowledge of the family of substituted urea compounds.

The Du Pont Company has invested over $3 million in research to develop the substituted urea weed killers. This does not include any plant investment. But the prospective returns to American agriculture make this research seem worthwhile.

U. S. Department of Agriculture studies indicate that in various western row crops, hand-weeding, hoeing, and cultivating (essentially weed control practices) take up to 80 per cent of the pre-harvest man-hours that go into crop production. Some of the crops where costs are high include cotton, onions, potatoes, sugar beets, and dry beans. There is considerable challenge to cut this kind of labor investment -- and chemical weed killers look like one good way to do it.

**EDITOR'S NOTE: The above article is based on a speech delivered by Dr. Carlson before the Western and California Weed Conference, held recently in Sacramento, California.**

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FIFTIETH ANNIVERSARY of the Federal Food and Drug Act of 1906 is being celebrated this year by the Association of Food and Drug Officials of the United States in partnership with the food, drug, chemical, and cosmetic industries. A segment of Du Pont's Cavalcade Theater, scheduled for TV network broadcast June 26, will pay tribute to the work of state and federal food and drug officials, and show how Du Pont, through its Haskell Laboratory and other facilities, helps protect public health.

## CHOOSING PROPER SIZE REFRIGERATION EQUIPMENT IMPORTANT IN EGG COOLING

Loss of quality while eggs are being held on the farm -- a perennial hot weather problem in the poultry business -- is being licked by many a poultryman through the use of mechanically refrigerated egg rooms.

Package-type commercial refrigeration units including the familiar window air conditioners, are making it easier than ever for the egg farmer to keep temperatures at approved levels in his storage room. Egg quality drops rapidly when temperatures rise above 70 degrees Fahrenheit. At the same time, it is not desirable to keep the storage room cooler than 55 degrees, for eggs held below that mark will sweat when returned to room temperature.

Since the ideal temperature for operating an egg cooler, then, is between 55 and 60 degrees, it is valuable to know the size of refrigeration equipment needed to properly cool a storage room accommodating any given size of flock. The table below was worked out by the University of Georgia and is based on a daily egg production of 60 per cent of flock size, with two pick-ups or deliveries per week. Ceiling heights may seem a little cramped for long-legged poultrymen, but the engineers who made up the dimensions explain that the height of the cooler can be increased up to 8'6" without requiring any change in the size of equipment specified.

According to a report from Clemson Agricultural College, flocks of less than 1,000 birds do not justify the expense of erecting and equipping an egg-cooling room or building. In fact, on farms with less than 3,000 birds it is suggested that one of the commercial egg-cooling cabinets with refrigeration equipment built in may be most economical. This cabinet, for small flocks,

Approximate Size of Egg Cooler and Refrigeration Equipment for Different Sizes of Flocks

| Size of Flock (No. of Birds) | Est. Daily Production (Cases) | Inside Dimensions of Cooler (WxLxH, Ft.) | Capacity Cases Stacked | Size Refrigeration Equipment |
|---|---|---|---|---|
| up to 1,500 | 2½ | 4x5x5 | 15 | 1/4 hp--2,490 Btu/hr. |
| 2,000 | 3 plus | 4x6x7 | 25 | 1/4 hp--2,490 Btu/hr. |
| 2,500 | 4 plus | 4x6x7 | 25 | 1/3 hp--3,240 Btu/hr. |
| 3,000 | 5 | 6x6x7½ | 35 | 1/3 hp--3,240 Btu/hr. |
| 4,000 | 6½ | 6x8x7½ | 45 | 1/2 hp--5,200 Btu/hr. |
| 5,000 | 8 | 6x8x7½ | 45 | 1/2 hp--5,200 Btu/hr. |
| 7,000 | 11½ | 8x8x7½ | 55 | 3/4 hp--7,650 Btu/hr. |
| 10,000 | 16½ | 8x10x7½ | 70 | 1 hp-11,000 Btu/hr. |

might be located in the coolest end of the laying house, or in the building or room set aside for grading or packing eggs, if such an area exists.

As with any refrigeration problem, the quarters used for egg cooling and storage should be well insulated to cut down the operating cost of the cooler. A concrete slab floor is desirable, but if a wooden floor is used, there should be sub-floor insulation to cut down on air circulation. Interior walls should be of a material that will stand up under high humidity.

The matter of humidity is, of course, an important one in proper egg storage. If the air is dry, eggs may deteriorate through loss of moisture. Relative humidity should be kept between 75 and 85 per cent. Selection of the proper equipment, using safe refrigerants such as "Freon" fluorinated hydrocarbons, is important and the guidance of a competent commercial refrigeration dealer can save many operational headaches by assuring that the installation will provide suitable initial cooling to lower rapidly the body temperature of freshly gathered eggs, maintain correct storage temperatures, and proper amount of moisture.

An 80 per cent relative humidity inside the cooler should give the feeling of clammy dampness. If the egg-storage room is not sufficiently humid, the proper amount of moisture in the air can be maintained by an electrical humidifier which does not require water connections, by pouring water on the concrete floor and allowing evaporation to take care of humidity, or (if the floor is wooden) by placing open pans of water in the room or using a metal-lined container of sand which is kept soaked with water.

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NYLON IN WORK PANTS
GIVES 70% MORE WEAR

Work pants that will wear 70 per cent longer than the pants you used to buy have been developed through the use of 25 per cent nylon in the warp of the trouser fabric. The use of this amount of nylon in the warp of the denim gives an approximate total nylon content of only 15 per cent, and adds an estimated 25 to 30 per cent to the retail price of the pants. This higher price is more than offset by the increased wear life, tests have shown.

The benefits of this small amount of nylon in demin work pants were demonstrated in a two-and-a-half year wear test, comparing the nylon-reinforced trousers with cotton ones of the same construction.

A group of 18 plumbers and welders took part in the test. It took them just 134 days on the job, as an average, to wear out the regular cotton work pants. Trousers of the same weight and construction, containing the nylon reinforcement, lasted an average of 228 days at the same work.

Work pants containing nylon reinforcement are now on the market and should be of interest for use on the farm.

## NEW JOBS AND NEW INCOME FROM NEW POSTWAR DU PONT PRODUCTS

The way in which new products have created new jobs and new income in the dynamic economy this country has experienced since the end of World War II was illustrated dramatically in a 10-year progress report which was a part of the recent annual report of the Du Pont Company for last year.

Sales of the company in 1955 of $1,909 million were 194 per cent above the $649 million of 1946 -- an annual growth rate of 13 per cent.

Sales in 1955 of those 1946 products which Du Pont is still manufacturing amounted to about $1,400 million, or more than twice as much as total 1946 sales. Major expansion of productive capacities for these products, included facilities for nylon fiber and plastics, neoprene, and agricultural chemicals.

"About 27 per cent of 1955 sales, or over $500 million, resulted from additions to Du Pont's product lines in the postwar period," Crawford H. Greenewalt, president of the company, reported. These additions include "Dacron" polyester fiber, "Orlon" acrylic fiber, "Mylar" polyester film, titanium metal, urea weed killers, "Ludox" colloidal silica, pure silicon, and certain new photographic papers, he added.

Meanwhile, the number of employees, excluding those at government-owned plants, increased 21 per cent, from an average of 72,002 in 1946 to 87,453 last year, while salaries, wages, and employee benefits more than doubled, to $543 million. The operating investment per employee nearly doubled, rising from $12,400 to $24,200.

EDITOR'S NOTE: Copy of the company's annual report will be sent on request.

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## PIG PARASITES NOW CONTROLLED BY LOW-LEVEL PHENOTHIAZINE FEEDING

"Strongyle" worms in swine can be controlled by the same type of low-level phenothiazine feeding that has proven its worth for cattle, according to new swine management recommendations from the University of Wisconsin. In a revised edition of the bulletin, "More Profit From Pigs," Wisconsin livestock authorities recommend direct attack on these parasites by feeding small amounts of phenothiazine in the grain each day.

Consultation with a veterinarian is advised before placing pigs on this program. One gram (1/28th of an ounce) per animal per day is recommended. "Strongyle" worms are a group of some 20 worms which infect hogs. This group includes the hookworm, the nodular worm, certain species of stomach worms but does not include large roundworms, lungworms, whip worms and thorny-headed worms.

# THE FUTURE OF "FUTURE FARMERS"

By C. W. Davis, General Manager
Grasselli Chemicals Department
E. I. du Pont de Nemours & Co., Inc.

The following is excerpted from a speech by Mr. Davis delivered recently to regional meetings of state and local supervisors and teacher trainers in agricultural education. Mr. Davis addressed these meetings in his capacity as chairman of the donors' committee of the Future Farmers Foundation.

Today, with a national population of 165 million people, 4¾ million farms are producing enough to create agricultural surpluses. But when today's boys reach middle age, we may have a population of 220 million people and today's output may not be enough.

If one of our chemical plants had the same situation that American agriculture faces today, we would say that there was ample capacity to meet the demand for the next few years. Consequently, we would put our effort primarily on cutting the unit cost of the product. We would also carry on our efforts to assume maximum safety in the operation and to guard against possible shutdowns and loss of production. This situation puts a premium on good management of the over-all operation.

We need good managers in every type of agricultural enterprise. In business we train managers by giving them experience in all aspects of our operations. They move from research to production, to sales, and transfer from one field of products to another. They are given assignments where they have to correlate many contradictory factors, and come up with recommendations for decision by their superiors.

It is not enough for one of our potential managers to be a good salesman, or a good engineer, or a good research man -- he's got to have a little of all these qualities, and many more.

I think there's a parallel between business management and farm management which can give you some ideas for future programs. Agriculture's main problem is often called the "price-cost" squeeze. And there is probably no problem in the world which makes so many demands on all the qualities of good management.

Farmers have been justly proud of the increase in output per man during the past twenty years or so. But in increasing their output per man they have also increased their annual purchase of goods and services and their long-time investment. The physical assets of American agriculture are now nearly 25 per cent higher than they were in 1940, figured on the basis of the 1940 dollar.

Now all of you know it takes more capital to get started in farming than it used to. And it takes more cash income

to keep a farm going. But are today's Future Farmers being trained to gauge the returns on their operating capital and on their operating expenses? Furthermore, are they being trained to be flexible managers, ready to drop an enterprise that isn't paying and switch to something that will make all their efforts worth while?

You may say it's too much to ask one man to operate a farm the year round and still keep up on all the factors which enter into business management decisions.

Well, that brings me to my second point -- careers related to agriculture. The fine boys who elect to make a lifetime career of farming itself, are getting more and more help from the thousands of others, who with the same kind of original background are going into careers related to agriculture -- in business, industry, education, research and government service.

It is estimated that at least 15,000 new jobs are available each year in fields where agricultural training is an asset.

Yet only a little over half that number of agricultural college graduates are actually going into these fields. Farmers are going to be looking more and more to trained experts off the farm for many of the answers to their problems. There are careers in industry for men interested in machinery and equipment, food processing, grain and seed processing, meat and poultry packing, production of chemicals and fertilizer, feed manufacturing, dairy processing, textiles and fibers, building materials and public utilities. All these have phases where an agricultural background is an asset to the employee, the business firm, and the customer. Railroads and trucking firms, banks and insurance companies, market reporting, inspection and regulatory activities, and many fields of education and public service require a profound knowledge of agriculture.

In our own company we have dozens of men with this kind of experience, and we will need more as our agricultural chemicals program expands.

These men have to be a combination of scientist, farmer, and practical mechanic. Without the "green thumb" that comes naturally to a good farm boy, our research people can't get to first base. But they also need all the resources of training in many fields of agricultural science.

Most of the topflight agricultural technical men in our company grew up on a farm somewhere -- studied at a state college of agriculture and brought to their jobs the practical knowledge of farming and the scientific training which it takes to make research pay off -- not only for the Du Pont Company, but for the farmer who is going to use our chemicals. And the same principles apply in every business that is serving agriculture today.

HERE'S SIMPLE METHOD FOR

CALIBRATING WEED SPRAYER

The importance of applying just the right amount of spray per acre was never so important as with some of the newer selective herbicides -- particularly where they are used for pre-emergence weed control.

Proper calibration of a sprayer to apply specified amounts can be a confusing and time-consuming job, unless a simple set of rules are followed. The instructions given below came from a recent bulletin from the University of Massachusetts and are one of the most explicit sets of directions yet seen for this operation:

"To be certain of applying the correct amount of herbicide, you must know the volume of spray delivered per acre. This may be checked by a test-run over some measured distance.

"1. Set marker at some measured distance -- the greater the distance the more accurate the calibration.

"2. Fill the tank with water and have pump in motion back of the starting line, with boom valve closed.

"3. Open valve as starting line is crossed and drive at rate to be used in spraying operation, with throttle in marked position.

"4. Shut valve as finish line is passed.

"5. Measure exact amount of water needed to refill the tank.

"6. To figure acre rate of discharge use the following formula: $\frac{43{,}560 \times \text{gallons used}}{\text{Distance (ft.)} \times \text{Length of boom (ft.)}}$ = gallons per acre"

Example: Assuming 14 gallons used, 660 ft. distance traveled, and 20 ft. length of boom, we have

$\frac{43{,}560 \times 14}{660 \times 20} = 46.2$ gallons per acre

You then decide either (1) to apply the recommended amount of herbicide to each 46 gallons of water or (2) a new gallonage rate by altering the speed, pressure, or nozzle opening.

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YEAR IN, YEAR OUT control programs to combat blackspot on roses will result in more and bigger early blooms, according to the U. S. Department of Agriculture. In experiments quoted, fungicidal dusts were applied weekly during the growing season. Use of zineb fungicide and ferbam-sulfur mixtures, gave particularly good results. These are old standbys in Du Pont garden products.

## EXPERIMENTERS' NOTATIONS

### A Round-up of Data from Across the Nation

After testing 13 different types of low-volume sprayer pumps, agricultural engineers at Cornell concluded that it seemed likely a diaphragm-type pump would be most efficient in pumping suspensions of wettable powders at pressures up to 100 psi (pounds per square inch). For test purposes, an abrasive mixture of 24 pounds of hydrated lime and 48 pounds of wettable sulfur per 100 gallons of water was used. The pumps were run continuously at 80 psi, but the spray material was changed frequently. Outstanding performers in these endurance tests were single-diaphragm and double-diaphragm pumps, both from the same manufacturer and built with neoprene diaphragms. After 500 and 700 hours, respectively, of pumping, these diaphragm pumps were still in excellent condition.

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"Karmex" W herbicide is reported as "the only soil sterilant that maintains sterility below the water line in irrigation ditches after the water has been turned in," by the University of California Agricultural Experiment Station.

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As an economic yardstick of the benefits from weed control, estimates of losses due to these pests are always interesting. R. B. Widdifield, agronomist of the North Dakota Agricultural College Extension Service, believes the loss in net income due to weeds in North Dakota averages about $1,000 a farm. As an example, he quotes studies made in Manitoba comparing weed-free grain plots with mustard-infested plots in the same field. In 1953, weed-free flax yielded 14 bushels per acre. Ten mustard plants per square yard reduced the flax yield to six bushels; 25 mustard plants per square yard sent the yield down to three bushels; 100 mustard plants per square yard cut it to one bushel per acre.

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Pecan scab disease in Oklahoma is being controlled by the combination of a chemical eradicant applied to trees during the dormant season, plus the use of ziram fungicide during the growing season to prevent reinfestation, according to Dr. Richard H. Converse, at the Oklahoma Agricultural Experiment Station. He found any of three materials -- PML, PCP, and MMA -- to be good scab eradicants. Tests on single trees where both eradicant and ziram were used resulted in average scab infections ranging from 0.3 to 0.9 lesions per nut. Where only an eradicant (MMA) was used, nearly six lesions per nut resulted. (Where ziram alone was used, injury averaged 2.5 lesions per nut.) And where no treatment of any sort was used, nearly 90 lesions per nut occurred.

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